

MSE 2701: Sounds of Human Language

Understanding the Science of Speech

Fall 2019

Course Information

- **Meeting Time:** Lecture: TR 2:30pm-3:45pm; Lab: T 10:00am-12:30pm or R 10:00am-12:30pm
- **Location:** Lecture: *TBD*; Lab: Tolentine 301A
- **Course Website:** <http://wraplab.co/courses/mse2701>
- **Class Email List:** fall119-mse-2701-all@villanova.edu
- **Instructor:** Dr. Joe Toscano (joseph.toscano@villanova.edu, 610-519-4755)
- **Availability:** Office hours are by appointment on [Dr Toscano's calendar](#).

Course Description

This course explores the sounds used in spoken language and how humans use language to communicate. We will discuss how speech sounds vary between talkers and across languages, and the mechanisms that human listeners use to recognize speech. Studying speech also has practical significance: it can help us improve computer systems designed to recognize speech, and it can help us develop better treatments for language disorders and test for hearing loss. The course also emphasizes the methods and techniques used to study speech perception, as well as the major theoretical debates that have informed work in this field.

Objectives

Throughout the course, we will explore concepts and techniques used in the scientific study of human speech, including how speech sounds are produced, learned, and perceived. We will examine a number of topics, including questions about language acquisition, how the brain processes speech, and how speech sounds vary between languages. In addition to learning content, the course includes a number of objectives related to understanding the scientific process:

- Science is about debates, and there is no shortage of debates about how humans understand spoken language. Debating ideas is one of the key ingredients in generating new scientific knowledge. The course is designed to provide you with a background on current debates in the field, as well as practice forming oral and written arguments, and backing them up with evidence.
- Hands-on laboratory experience is critical for understanding the scientific process and gaining the technical skills needed to be a scientist. In lab, we will learn how to design experiments, collect data, and perform statistical analyses. After learning these techniques, you will build on this knowledge to complete your own experiment in the second half of the course.
- An interdisciplinary perspective provides a rich context for understanding the impact of science on society. We will examine how scientific work on speech and language intersects with research in the humanities and social sciences. These discussions will focus on how our

understanding of the sounds used in human language influences the way we think about and use language in general.

Course Materials

All required reading material will be posted on the course website. In particular, I have written a series of background readings for the course that provide an introduction to each of the topics we will be discussing. *Be sure to read this material before class!* I have endeavored to keep the background readings short to help you keep up with them. We will have an opportunity to discuss the readings in class, so please bring any questions you have about them. You are also welcome to come see me during office hours to discuss anything you didn't understand in the readings.

Course Requirements

Assessments

Course assessments will focus on using what you have learned to demonstrate your ability in three areas: (1) exams will allow you to demonstrate your ability to formulate written arguments about the debates and topics we cover, and support your arguments with evidence; (2) class participation and discussion will allow you to demonstrate your ability to make an oral argument and take an informed stance on a debate; and (3) laboratory exercises will allow you to demonstrate your technical skills. Grades will be based on points earned for each of these assessments.

	Assessment	Points	Grade percentage
Exams (50%)	Midterm 1	50 pts	12.5%
	Midterm 2	50 pts	12.5%
	Final exam (cumulative)	100 pts	25%
Participation (20%)	Student-led discussion	60 pts	15%
	Response journal	20 pts	5%
Lab activities (30%)	Lab reports (5 total)	80 pts (16 pts each)	20%
	Final project	40 pts	10%

Grading Scale

A-...90.00-93.32%	A...>93.32%	
B-...80.00-83.32%	B...83.33-86.66%	B+...86.67-89.99%
C-...70.00-73.32%	C...73.33-76.66%	C+...76.67-79.99%
D-...60.00-63.32%	D...63.33-66.66%	D+...66.67-69.99%
F...<60.00%		

Exams

There will be three exams (two non-cumulative midterms and a cumulative final exam). The goal of the exams is to demonstrate your understanding of the concepts covered in class, apply the scientific principles you have learned, and take a stance on current debates in the field, backing up your claims with evidence. Questions will be drawn from material presented in lecture and lab, as well as material presented in articles and background readings.

For each exam, you are entitled to one sheet of handwritten notes (front and back of one piece of paper). Each student must write their own note sheet. I will collect these with the exams, but you are welcome to have them back with your graded exam. I suggest using the note sheet as a study tool to help you organize your thoughts and the evidence that informs the debates we discuss in class. In fact, you may find that the process of creating the note sheet is more helpful than using it during the exam.

You may request a make-up exam if you have an authorized University absence/ Excused absences are described in the [University's official Attendance Policy](#). Please speak to me in person if you have an authorized absence that requires you to make-up a scheduled exam.

Participation

Discussing research with other scholars is an important part of the scientific process. Therefore, you and your fellow students will get the most out of the course if you attend every class. Moreover, in order to do well on the exams, it is crucial that you attend the lectures and class discussions. Please arrive on time and contribute to class discussions and activities. If you must miss class, I will be happy to meet with you to go over any material you would like. Just send me a message.

Student-led discussion. Many of our class periods will be devoted to discussion of current research and debates in the field, centered around one or more journal articles on the topic. Each discussion will be led by myself and several students in the class. You will have an opportunity to select your discussion topics on the first day of class. You do not need to meet with the other discussion leaders before class (but you are welcome to if you want!). Instead, each student should be prepared to contribute to the discussion of the article, understanding the hypotheses put forth, the approach used, and the results, as well as how the data fit with one or more broader theories of speech perception and language processing. Each discussion leader should contribute to presenting their thoughts and guiding the discussion in class. Everyone else is encouraged to participate in the discussion as well. I will provide a handout with guidelines about what to look for in each of the articles to help organize your thoughts prior to the discussion. *It's okay if there are things in the article you don't understand* —that's part of the reason we discuss the material together. I am also happy to meet with you before class to answer any questions. If you must miss class for some reason on a day you are scheduled to lead discussion, please meet with me to make up the work.

Journals. One of the key themes of the semester will be learning to ask and answer questions scientifically. In addition to asking questions in our class discussions, another way to practice this skill is with a response journal. I will leave a few minutes at the end of each class to complete this assignment. You may be asked to respond to specific questions, to summarize the key points of the day's lecture, or to discuss questions you still have on the topic. I will collect the journals at the end of class, and you will receive 1 point for each journal entry, up to a total of 20 points over the course of the semester (5% of the course grade). I will review the journals before each class, and we will have an opportunity to discuss any questions you had at the beginning of the next class.

Lab assignments

There will be weekly laboratory meetings during the semester. These meetings are designed to give you hands-on experience with the tools used by scientists to study speech. There will be a total of five lab exercises that you will complete over the course of the semester, as well as a final project. Details for each lab exercise will be given in laboratory meetings and will be available on the course website. The exercises are designed to build on each other, so the techniques you learn from the first exercise will be useful for the second one, and so on. Ultimately, the skills you learn in the lab will be used to complete your final project.

Lab reports. Following each of the five lab exercises, you will write a lab report detailing what you accomplished during the lab. Your lab report should be written as a summary of what you accomplished during the lab activity. The lab report is purposefully left open-ended so that you can describe your results in the way you think is best. We will discuss how to write a lab report together in class.

Final lab project. The final project will combine what you have learned in lecture with the skills covered in laboratory meetings throughout the semester. The goal of the final project is to use what you have learned to design, run, and analyze the results of a new experiment. This experiment can take many different forms. Examples will be provided, but you should feel free to think outside the box. Critically, you must: (1) base your experiment on some previous findings about the sounds of language, (2) present a clear hypothesis, (3) collect the data necessary to test your hypothesis, and (4) analyze and report the results. You will turn in a write-up of the experiment, and present your results to the class during the last lab meeting of the semester. More details on the project will be provided later in the semester.

Course Policies

Standard Villanova Course Policies

- **Office of Disabilities and Learning Support Services:** It is the policy of Villanova to make reasonable academic accommodations for qualified individuals with disabilities. Go to the Learning Support Services website (<http://learningsupportservices.villanova.edu>) for registration guidelines and instructions. For physical access or temporarily disabling conditions, please contact the Office of Disability Services at 610-519-4095 or email Stephen.mcwilliams@villanova.edu. Registration is needed in order to receive accommodations.
- **Academic Integrity:** All students are expected to uphold Villanova's Academic Integrity Policy and Code. Any incident of academic dishonesty will be reported to the Dean of the College of Liberal Arts and Sciences for disciplinary action. For the College's statement on Academic Integrity, you should consult the [Enchiridion](#). You may view the university's Academic Integrity Policy and Code, as well as other useful information related to writing papers, at the Academic Integrity Gateway web site: <http://library.villanova.edu/Help/AcademicIntegrity>. *Instances of academic integrity violations in this course will result in a zero for the assignment, and may result in an F for the course grade.*
- **Absences for Religious Holidays:** Villanova University makes every reasonable effort to allow members of the community to observe their religious holidays, consistent with the University's obligations, responsibilities, and policies. Students who expect to miss a class or assignment due to the observance of a religious holiday should discuss the matter with their professors as soon as possible, normally at least two weeks in advance. Absence from classes

or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the absence.

<https://www1.villanova.edu/villanova/provost/resources/student/policies/religiousholidays.html>

Course-specific Policies

- **Late Assignments:** Except for class discussions, response journal, and exams, an automatic 3-day grace period applies to late assignments, such that any assignment submitted within three days of the due date will be graded without penalty. Assignments submitted after this grace period without prior approval will lose 25% of the total points, and *assignments submitted more than two weeks after the due date without prior approval will receive zero points*. If you will not be able to submit an assignment by the due date, let me know so we can work something out.
- **Laptop Use:** You are welcome to use your laptop *for class-related activities* (e.g., taking notes, viewing articles, looking up material we are discussing). Web surfing, texting, browsing Facebook, etc. is not allowed. Please be courteous to your fellow students, as it is very distracting if you are not focused on the course material.
- **Modifications to Syllabus:** If any information in the syllabus changes during the course of the semester, an updated version will be posted on the course website (i.e., this webpage).

Course Schedule

Note: SoHL = Sounds of Human Language background readings

Date	Topic	Readings	Deadlines/Notes
8/27	Introduction	SoHL: Methods used in the Science of Speech	No lab this week
8/29	Acoustics	SoHL: Principles of Acoustics	
9/2	Phonetics	SoHL: Phonetics	
9/5	Phonetics (continued)		
9/10	Speech Sounds in Other Languages		
9/12	Article Discussion: Language Variability	Lupyan and Dale (2016)	Lab 1 report due
9/17	Accents and Dialects	SoHL: Variability in Speech	
9/19	Article Discussion: Identifying Accents	Clopper and Pisoni (2004)	Lab 2 report due
9/24	<u>Debate</u> : Bilingual Advantage	Marian and Shook (2012)	

9/26	Article Discussion: Publication Bias and the Bilingual Advantage	de Bruin et al. (2015)	Lab 3 report due
10/1	Unit 1 Summary and Exam Review		
10/3	EXAM 1		
10/8	<u>Debate</u> : Categorical vs. Continuous Perception	SoHL: Categorical Perception	
10/10	Article Discussion: Speech Sound Categorization	Holt & Lotto (2010)	Lab 4 report due
10/15	<i>No class—Fall Break</i>		
10/17	<i>No class—Fall Break</i>		
10/22	<u>Debate</u> : Bottom-up vs. Top-down Processing	SoHL: Context Effects	Lab 5 report due
10/24	Article Discussion: Interactivity in Speech Perception	McClelland et al. (2006) McQueen et al. (2006)	
10/29	<u>Debate</u> : Articulatory vs. Auditory Models	SoHL: Models of Speech Perception	
10/31	Models of Spoken Word Recognition		
11/5	Neuroscience of Language	SoHL: Neurobiology of Speech Perception	
11/7	Article Discussion: ERP Measures of Speech Perception	Toscano et al. (2010) Getz and Toscano (2019)	
11/12	Unit 2 Summary and Exam Review		
11/14	EXAM 2		
11/19	<u>Debate</u> : Nativism vs. Empiricism in Language Development	SoHL: Speech Development	
11/21	Article Discussion: Rules vs. Statistics	Saffran, Aslin, and Newport (1996) Marcus et al. (2007)	
11/26	Developmental Language Disorder		No lab this week
11/28	<i>No class—Thanksgiving Break</i>		
12/3	Hearing Loss	SoHL: Hearing Loss	

12/5	Article Discussion: Language Processing in Deaf and Hearing Subjects	Neville et al. (1998) Hickok et al. (1998)	Final project due; final presentations in lab
12/10	<i>No class—Friday Schedule</i>		No lab this week
12/12	Unit 3 Summary and Exam Review		